Revised ~~12/15/2000~~ 11/15/2003

BLUE WHALE (*Balaenoptera musculus*): ~~Hawaiian~~ Western North Pacific Stock

STOCK DEFINITION AND GEOGRAPHIC RANGE

~~Blue whales are extremely rare in Hawaii. The only published sighting record is that of Berzin and Rovnin (1966) north of the Hawaiian Islands. Additional evidence that blue whales occur in this area comes from acoustic recordings made off Oahu and Midway Islands (Northrop et al. 1971; Thompson and Friedl 1982; McDonald and Fox 1999). Although the exact positions of the whales producing the sounds could not be determined, at least some of them were within the U.S. Exclusive Economic Zone. The recordings made off Oahu showed bimodal peaks throughout the year, suggesting that the animals were migrating into the area in summer and winter.~~

~~The stock structure of blue whales in the North Pacific is uncertain (Mizroch et al. 1984; Reilly and Thayer 1990; Reeves et al. 1998).~~ The International Whaling Commission (IWC) has formally considered only one management stock for blue whales in the North Pacific (Donovan 1991), but ~~now this ocean is thought to include~~ up to five populations have been proposed (Reeves et al. 1998)~~, with two occurring within the U.S. EEZ~~. Rice (1974) hypothesized that blue whales from Baja California migrated far offshore to fed in the eastern Aleutians or Gulf of Alaska and returned to feed in California waters; however, he has more recently concluded that the California population is separate from the Gulf of Alaska population (Rice 1992). Length frequency analyses (Gilpatrick et al. 1996) and photo-identification studies (Calambokidis et al. 1995) support separate population status for blue whales feeding off California and those feeding in Alaskan waters. Whaling catch data indicate that whales feeding along the Aleutian Islands are probably part of a central Pacific stock (Reeves et al. 1998), which may migrate to offshore waters north of Hawaii in winter (Berzin and Rovnin 1966). ~~Recently, however blue~~ Blue whale feeding aggregations have not been found in Alaska despite several surveys (Leatherwood et al. 1982; Stewart et al. 1987; Forney and Brownell 1996); however, blue whale calls have been recorded there between 1995 and 2001 (Stafford et al. 2001, Stafford 2003).

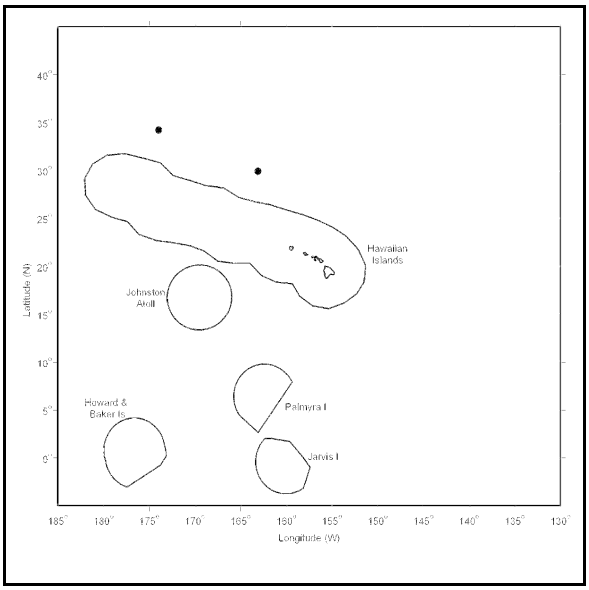

Figure 1. Locations of two blue whale sightings made by observers aboard Hawaii-based longline fishing vessels in July 1994 and February 1997 (NMFS/PIR unpublished data). Lines represent U.S. Exclusive Economic Zones surrounding the Hawaiian Islands and other U.S. territories in the central Pacific.

Recent analyses of acoustic data obtained throughout the North Pacific Ocean (Stafford et al. 2001; Stafford 2003) has revealed two distinct blue whale call types, suggesting two North Pacific stocks: eastern and western. The regional occurrence patterns indicate that blue whales from the eastern North Pacific stock winter off Mexico, central America, and as far south as 8°S (Stafford et al. 1999), and feed during summer off the U. S. West Coast and to a lesser extent in the Gulf of Alaska, and in central North Pacific waters. ~~One group of animals feeds~~ This stock has previously been documented to feed in waters off California (and occasionally as far north as British Columbia; Calambokidis et al. 1998) ~~in California waters~~ in summer/fall (from June to November) migrating ~~and migrates~~ south to productive areas off Mexico (Calambokidis et al. 1990) and as far south as the Costa Rica Dome (10^{o} N) in winter/spring (Mate et al. 1999, Stafford et al. 1999). Blue whales belonging to the western Pacific stock appear to feed in summer southwest of Kamchatka, south of the Aleutians, and in the Gulf of Alaska (Stafford 2003; Watkins et al. 2000), and in winter they migrate to lower latitudes in the western Pacific and less frequently in the central Pacific, including Hawaii (Stafford et al. 2001). The only published sighting record of blue whales near Hawaii is that of Berzin and Rovnin (1966). Two sightings have been made by observers on Hawaii-based longline vessels (Figure 1; NMFS unpublished data). Additional evidence that blue whales occur in this area comes from acoustic recordings made off Oahu and Midway Islands (Northrop et al. 1971; Thompson and Friedl 1982), which included at least some within the U.S. Exclusive Economic Zone. The recordings made off Hawaii showed bimodal peaks throughout the year (Stafford et al. 2001), with western

Pacific call types heard during winter and eastern Pacific calls heard during summer. ~~For management in U.S. Pacific waters outside the continental EEZ, the Hawaiian stock includes only those whales within the EEZ of the Hawaiian Islands. One other stock of North Pacific blue whales (off California and Mexico) is recognized in the Marine Mammal Protection Act (MMPA) stock Assessment Reports.~~ For the Marine Mammal Protection Act (MMPA) stock assessment reports, there are two blue whale stocks within the Pacific U.S. EEZ: 1) the western North Pacific stock (this report), which includes whales found around the Hawaiian Islands during winter, 2) the eastern North Pacific stock, which feeds primarily off California.

POPULATION SIZE

From ship line-transect surveys, Wade and Gerrodette (1993) estimated 1,400 blue whales for the eastern tropical Pacific. A weighted average estimate of ~~1,940~~ 1,744 blue whales is available for California, Oregon and Washington, based on ~~1991-96~~ shipboard line-transect surveys in 1996 and 2002(Barlow ~~1997~~2003) and photographic mark-recapture estimates (Calambokidis et al. 2003 ~~and Steiger 1994~~). No data are available to estimate population size for any other North Pacific blue whale population, including the putative central stock that apparently summered along the Aleutians and wintered north of Hawaii. No blue whale sightings were made during a ~~A~~ summer 1994 shipboard survey ~~within the historical whaling grounds~~ south of the Aleutian Islands ~~yielded no blue whale sightings~~ (Forney and Brownell 1996), ~~nor did a total of~~ during twelve aerial surveys conducted in 1993-98 within about 25 nmi of the main Hawaiian Islands ~~as part of the Marine Mammal Research Program of the Acoustic Thermometry of Ocean Climate (ATOC) study~~ (Mobley et al. 2000), or during a summer/fall 2002 shipboard surveys of the entire Hawaiian EEZ. Therefore, no estimate of abundance is available for the western Pacific blue whale stock.

Minimum Population Estimate

No data are available to provide a minimum population estimate.

Current Population Trend

No data are available on current population trend.

CURRENT AND MAXIMUM NET PRODUCTIVITY RATES

No data are available on current or maximum net productivity rate.

POTENTIAL BIOLOGICAL REMOVAL

No PBR can be calculated for this stock at this time.

HUMAN-CAUSED MORTALITY AND SERIOUS INJURY

Fishery Information

~~No estimate of annual human-caused mortality and serious injury is available as there are no reports of recent direct or incidental takes of blue whales in Hawaiian waters. However, mortality of other cetacean species has been observed in Hawaiian fisheries, and the gear types used in these fisheries are responsible for marine mammal mortality and serious injury in other fisheries throughout U.S. waters. Gillnets are used in Hawaiian waters and appear to capture marine mammals wherever they are used, and float lines from lobster traps and longlines can be expected to occasionally entangle whales (Perrin et al. 1994). Interactions with dolphins are reported for all pelagic fisheries, and humpback whales have been entangled in longlines off the Hawaiian Islands, but no takes of blue whales have been documented (Nitta and Henderson 1993). None were observed hooked or entangled in the Hawaiian longline fishery between 1994 and 1998, with approximately 4.4% of all effort (measured as the number of hooks fished) observed (Kleiber 1999).~~

Information on fishery-related mortality of cetaceans in Hawaiian waters is limited, but the gear types used in Hawaiian fisheries are responsible for marine mammal mortality and serious injury in other fisheries throughout U.S. waters. Gillnets appear to capture marine mammals wherever they are used, and float lines from lobster traps and longlines can be expected to occasionally entangle whales (Perrin et al. 1994). In Hawaii, no mortality of blue whales has been observed in inshore gillnets, but these fisheries are not observed or monitored. Regulations governing the use of nearshore gillnets (lay nets) are currently under review by the State of Hawaii, and a ban on nearshore gillnets is being considered.

Interactions with cetaceans are reported for all pelagic fisheries, and large whales have been entangled in longline gear off the Hawaiian Islands (Nitta and Henderson 1993, Forney 2003). Between 1994 and 2002, no interactions with blue whales were observed in the Hawaiian longline fishery, with approximately 4-25% of all effort

observed (Forney 2003).

Historical Mortality

At least 9,500 blue whales were taken by commercial whalers throughout the North Pacific between 1910 and 1965 (Ohsumi and Wada 1972). Some proportion of this total may have been from a population or populations that migrate seasonally into the Hawaiian EEZ. The species has been protected in the North Pacific by the IWC since 1966.

STATUS OF STOCK

The status of blue whales in Hawaiian waters relative to OSP is unknown, and there are insufficient data to evaluate trends in abundance. Blue whales are formally listed as "endangered" under the Endangered Species Act (ESA), and consequently the Hawaiian stock is automatically considered as a "depleted" and "strategic" stock under the MMPA. ~~The total fishery mortality and serious injury for blue whales is zero and therefore can be considered to be insignificant and approaching zero mortality and serious injury rate~~. Insufficient information is available to determine whether the total fishery mortality and serious injury for blue whales is insignificant and approaching zero mortality and serious injury rate. The increasing levels of anthropogenic noise in the world's oceans has been suggested to be a habitat concern for blue whales (Reeves et al. 1998).

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